

TAXONOMY OF THE *ERIGERON PRINGLEI* GROUP (ASTERACEAE:
ASTEREAE)

Guy L. Nesom

Department of Botany, University of Texas, Austin, Texas 78713 U.S.A.

ABSTRACT

Three previously undescribed species of *Erigeron* endemic to Arizona are recognized, *E. heliographis* sp. nov. of the Pinaleno Mountains in Graham County, *E. anchana* sp. nov. primarily of the Sierra Ancha in Gila County, and *E. saxatilis* sp. nov. of south central Coconino County. All three appear to be closely related to *E. pringlei* A. Gray, but in contrast to the pinnatifid basal leaves of *E. pringlei*, each of the new species has entire basal leaves. A map and key to these four species, and a formal description for each of them are presented.

KEY WORDS: *Erigeron*, Astereae, Asteraceae, Arizona

During the 40 years, since the publication of Cronquist's study of North American *Erigeron* (1947), a number of specimens have accumulated that have been identified as *E. pringlei* A. Gray. Among these plants, the leaves vary from pinnatifid to entire and from linear or linear oblanceolate (0.5 to 2.0 mm wide) to obovate spatulate (4 to 10 mm wide). Cronquist's observation (1947, p. 210), however, that *E. pringlei* is "thoroughly distinct from all others, and need never be confused with anything else" remains generally valid with regard to this group of closely related populations, which are similar among themselves in their rocky habitats, rhizomelike caudex branches roughened by persistent leaf bases, stems and leaves that are eglandular and sparsely short strigose (with hairs 0.1-0.3 mm long) to nearly glabrous, erect buds, relatively small heads on leafy stems, phyllaries that are strongly graduated and glabrous to glabrate, and ray flowers with white, reflexing ligules. All plants of the *E. pringlei* group are restricted to Arizona, where they grow in rock crevices or ledges on boulders and vertical rock faces.

Among these populations, however, three distinct entities can be identified apart from *Erigeron pringlei*, and I recognize four species within the group. The three new ones are distinct from *E. pringlei* particularly in their entire

leaves and lack of a prominent outer pappus. Each is morphologically as well as geographically (Map 1) distinct, although two instances of possible intergradation are noted below. The four species of the *E. pringlei* group might be treated as geographic entities within a single species, where they would be given formal status as varieties. The differences among them, however, are consistent with the degree of difference found among other groups of similar, closely related species of North American *Erigeron* traditionally recognized as distinct.

KEY TO THE SPECIES OF THE *ERIGERON PRINGLEI* GROUP

1. Leaves pinnatifid with 2-3(-5) pairs of lobes; pappus of 11-16 thick bristles 1.8-2.0 mm long, with a prominent outer series of squamellae or thick setae *E. pringlei*
- 1' Leaves entire or rarely with a pair of lobes; pappus of 9-26 bristles 2.2-3.1 mm long, with a barely developed outer series of slender setae (2)
 2. Leaves linear, 0.5-0.9 mm wide; pappus bristles 16-21, 2.9-3.1 mm long *E. heliographis*
 - 2' Leaves oblanceolate to spatulate; pappus bristles 9-26, 2.2-2.7 mm long (3)
3. Stems mostly 3-5 cm long; basal leaves linear oblanceolate to slightly spatulate, 1-3 cm long, 0.5-2.0(-3.0) mm wide at the widest point, the petiole when distinct, about as long as the blade; midvein of phyllaries greenish yellow, not at all swollen; ray flowers 20-29, the ligules 1.0-1.5 mm wide; disc corollas without prominent orange resinous veins; pappus of 9-13(-15) fragile bristles *E. saxatilis*
- 3' Stems mostly 7-22 cm long; basal leaves spatulate, (3-)4-9 cm long, the blade 4-8 mm wide, the petiole about twice as long as the blade; midvein of phyllaries orange resinous, slightly but distinctly swollen; ray flowers 24-36, the ligules 0.6-1.0 mm wide; disc corollas with prominent orange resinous veins; pappus of 19-26 thick bristles *E. anchana*

Erigeron pringlei A. Gray, Proc. Amer. Acad. Arts 17:210. 1882. TYPE: UNITED STATES. Arizona: Santa Cruz Co., Mt. Wrightson, clefts of ledges and cliffs, 8500-9400 ft, 6 Jun 1881, C.G. Pringle s.n. (HOLOTYPE: GH!; Isotypes: NY!, US!).

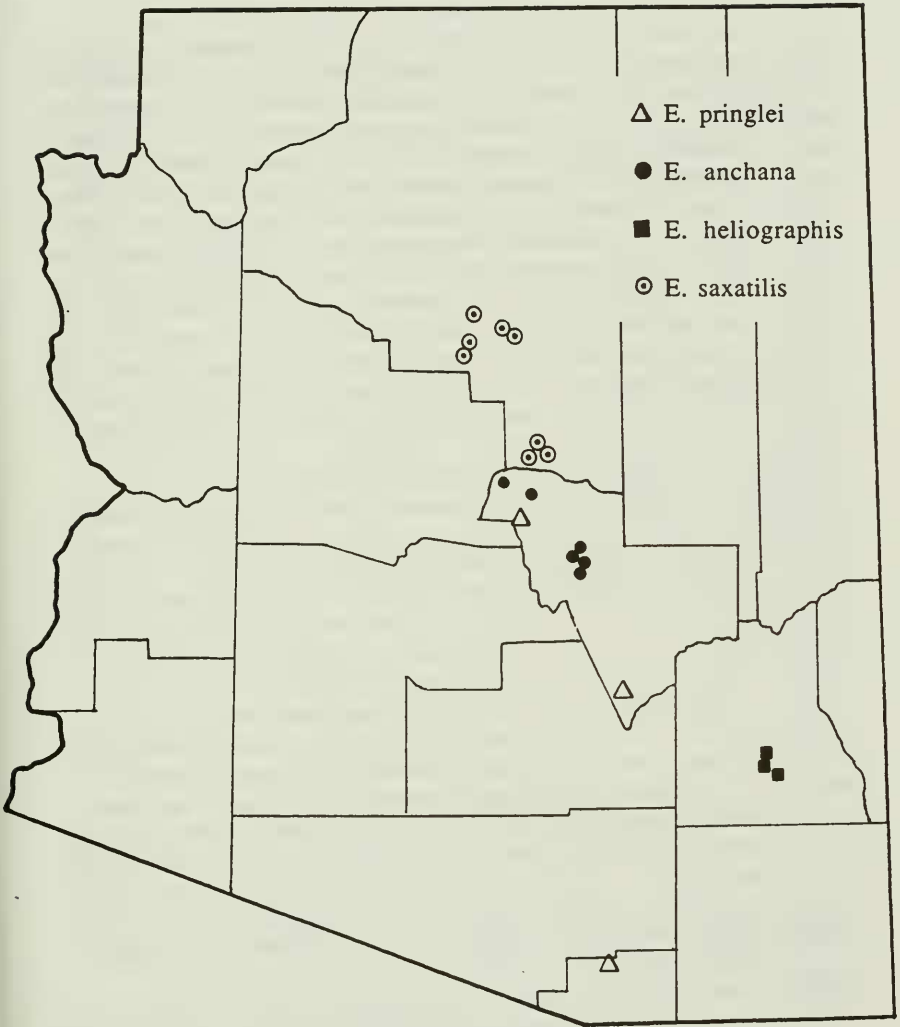


Figure 1. Geographic distribution of *Erigeron pringlei*, *E. anchana*, *E. heliographis*, and *E. saxatilis*.

Perennials from a thick taproot bearing several, thick caudex branches 1-2(-7) cm long and roughened with old petiole bases, these short and crowded to longer and rhizomelike. Stems 4-16 cm long, erect to arching, unbranched or less commonly with 1-2 short branches, sparsely to moderately short strigose. Basal leaves spatulate and long petiolate, (1-)2-6 cm long, the blades apically 3 lobed to pinnatifid, obovate in outline, 4-10 mm wide, usually with 2-3(-5) pairs of lobes, the cauline gradually reduced upwards, entire, narrowly oblanceolate. Heads 5-6 mm wide, on leafy stems; phyllaries often purplish, glabrous to very sparsely strigose, in 3-4 strongly graduated series, the innermost (3.0-)3.5-4.5 mm long. Ray flowers 20-35 with corollas 6-8 mm long, ligules white to pinkish, sometimes with a midstripe beneath, reflexing. Disc corollas 2.5-3.5 mm long, narrowly funnelform, not strongly inflated or indurated. Pappus of 11-16 bristles ca. 2 mm long, with a short but prominent series of outer setae or lanceolate squamellae 0.2-0.3 mm long. Flowering May-August(-September), 6200-9250 ft.

Additional collections examined: UNITED STATES: Arizona. Gila Co.: Mescal Mts., north face below El Capitan and Pioneer peaks, ledges and rock face in shade with *Heuchera*, ferns and mosses, 6200 ft, 10 Jul 1978, *Bingham 2775* (ASU); Mazatzal Mts., Barnhardt Pass, 1500-1710 m, 7 Sep 1935, *Colom s.n.* (ARIZ). Santa Cruz Co., Santa Rita Mts.: Mt. Wrightson, Madera Canyon, cracks of N facing cliff, 9250 ft, 18 May 1986, *Bertelsen s.n.* (ARIZ); Mt. Wrightson, cliff faces below peaks, 9000 ft, E exposure, 3 Jun 1987, *Bertelsen s.n.* (ARIZ); cliffs, 25 Jul 1884, *Pringle s.n.* (NY).

The plants of the Santa Rita Mountains are somewhat smaller (stems 4-7 cm long, caudex branches 1-2 cm long) than those from the two more northern localities. There appear to be no other morphological features, however, that would clearly distinguish them, although these disjunct populations probably have been isolated for long periods of time and some accumulated differences might be expected. The long branches are more similar to those of *Erigeron anchana*, described below, than to typical *E. pringlei*. Field study and collections from additional sites will be essential to a more critical interpretation of variation among these plants. See further comments following *E. anchana*.

Erigeron heliographis Nesom, *sp. nov.* TYPE: UNITED STATES. Arizona: Graham Co., Pinaleno Mts., 1 1/8 mi above Shannon Campground on trail to Heliograph Peak lookout, crevices of exposed bedrock, 10 Jun 1984, *T. & R. Van Devender 84-292* (HOLOTYPE: ARIZ!; Isotype: TEX!).

Differt a *Erigeron pringlei* A. Gray foliis linearibus integrisque et pappi setis numerosioribus atque serie externa vix evoluta. A *E. sazetali* Nesom similis sed foliis linearibus et setis pappi numerosioribus differt.

Perennials from a thick taproot bearing several crowded, thick caudex branches 1-3 cm long and roughened with old petiole bases. Stems sparsely to moderately short strigose, 1.5-4.5 cm long, erect to ascending, unbranched or rarely with 1-2 branches. Basal leaves tufted, erect, linear or very slightly broadened upward, 1-2(-4) cm long, 0.5-0.9 mm wide, entire, sparsely short strigose to nearly glabrous; cauline like the basal, slightly reduced upwards or reduced to linear bracts below the heads. Heads on bracteate peduncles 5-10 mm long, 5-6 mm wide (pressed); phyllaries elliptic-ob lanceolate, glabrous or very sparsely strigose, usually purplish, with slightly lacerate ciliate margins, strongly graduated in 3-4 series, the innermost 3-4 mm long. Ray flowers 20-23 in a single series, the corollas 5-8 mm long, white, drying white to lavender, the ligules 1.2-1.8 mm wide, reflexing with maturity. Disc corollas 3.0-3.5 mm long, narrowly funnellform. Achenes sparsely strigose, ca. 1.2 mm long; pappus of 16-21 persistent bristles, the longest ca. 3 mm long, with a few, outer setae or squamellae 0.2-0.3 mm long. Flowering May-July, 8250-9500 ft.

Additional collections examined: UNITED STATES. Arizona. Graham Co., Pinaleno Mts.: Mt. Graham, mixed conifer forest, 9000 ft, 16 Jun 1983, *Johnson 1146* (ASU); Fort Grant Lookout, dry, W facing mountain side, 9356 ft, 25 Jun 1966, *Moore, Pinkava, & Lehto 6543* (ASU, NCU); NE side of Heliograph Peak, ca. 1.2 mi above Shannon Natl. Forest Campground on trail to peak, 9400 ft, 15 Jul 1989, *Nesom 7070* (ARIZ, NY, TEX); lookout near Post Creek, Swift Trail, rocky S slope, 9400 ft, 4 Sep 1944 (past fir and frt), *Pultz, et al. 1158* (ARIZ); Heliograph Peak on trail from Shannon to the summit at fork with Arcadia trail, 22 Aug 1987, *Reichhardt 87-94* (ASU); Marijilda Canyon, ca. 0.5 mi NE of Shannon Camp, crack of E facing cliff face, 8250 ft, 4 Jul 1980, *Yatskievych 80-241* (ARIZ).

Erigeron heliographis differs from *E. pringlei* in leaf shape, linear, entire in the former, but deeply oblanceolate, pinnatifid in the latter. These shapes appear to be consistent within both species, and examination of several hundred scattered individuals (all that could be found) at the type locality of *E. heliographis*, has further confirmed this morphological constancy.

***Erigeron anchana* Nesom, sp. nov.** TYPE: UNITED STATES. Arizona: Gila Co., Sierra Ancha, Devil's Chasm, scattered on granite cliff face near canyon bottom, 3600 ft, 7 Aug 1981, *G. Yatskievych 81-305* (HOLOTYPE: ARIZ!; Isotype: TEX!).

Differt a *Erigeron pringlei* A. Gray caulibus longioribus, foliis longioribus integrisque, et pappi setis numerosioribus atque serie externa vix evoluta.

Perennials from a thick taproot bearing several, crowded, thick caudex branches 2-3 cm long and roughened with old petiole bases, the stems and leaves nearly glabrous to sparsely pubescent with ascending-appressed hairs

0.1-0.3 mm long. Stems 7-22 cm long, ascending to somewhat pendant, usually with a few branches above the middle. Basal leaves (3-)4-9 cm long, the blades obovate, entire, 2-3 cm long, 4-8 mm wide, gradually attenuate to a linear petiole 2-5 cm long, usually about twice the length of the blade, the cauline only slightly reduced upwards, oblanceolate epetiolate at midstem, the upper becoming linear, 1 cm long. Heads 5-10 mm long, 5-7 mm wide (pressed), on bracteate peduncles; phyllaries elliptic-oblanceolate, glabrous or very sparsely strigose, usually purplish, with slightly lacerate ciliate margins, strongly graduated in 3-4 series, the innermost 3.0-3.5 mm long. Ray flowers 24-36 in a single series, the corollas 6-8 mm long, white, drying white to lavender, the ligules 0.6-1.0 mm wide, reflexing with maturity. Disc corollas narrowly funnellform, 2.0-2.8 mm long. Achenes 1.2-1.4 mm long, sparsely strigose; pappus of 19-26 persistent bristles, the longest 2.3-2.6 mm long, with a few, outer setae or squamellae 0.2-0.3 mm long. Chromosome number, $n=9$ pairs. Flowering (May-)June-November, 3600-7000 ft.

Additional collections examined: UNITED STATES. Arizona. Gila Co., Sierra Ancha: cliffs opposite Workman Falls, 24 May 1981, *Bowers & McLaughlin 2149* (ARIZ); rim of Puebla Canyon, 13 May 1931, *Harrison 7884* (ARIZ); Workman Creek Falls, cliff pockets, 6600 ft, 12 Aug 1958, *Johnston s.n.* (ASU); Tonto Forest Road 405 at Tonto Creek, 4.4 mi S of Rte. 160, 7 Jun 1973, *Lehr & Weber 990* (ASU); road to Aztec Peak, between hwy to Young and Workman Creek Falls, W facing slope along Workman Creek in ponderosa pine-gambel oak forest, 30 Jun 1978, *Lehto 23158* (ASU, NY); road to Aztec Peak, just below Workman Creek Falls. roadside at cliff base, 3 Nov 1979, *Lehto 24123* (ASU); "natural corral," 4500 ft, [no date], *Little 4204* (ASU); Parker Creek Canyon, 4000-6000 ft, 22 Jul 1968, *Pase & Keil 3401* (ASU); cliff face by Workman Creek road above the falls, 7000 ft, 3 Aug 1958, *Wagner 306* (DUKE); NW wall of Devil's Chasm ca. 0.25 km above spring, 4400 ft, 29 Aug 1982, *Windham & Windham 82-2* (ASC) (voucher for chromosome count of $n=9$ [Schaack 1983]; Tonto Natural Bridge, [ca. 4 mi S of Pine], limestone boulders along Pine Creek at base of bridge, 4535 ft, 22 May 1986, *Benham 831* (ASC); Tonto Natural Bridge, 21 Aug 1937, *Darrow s.n.* (NY); Tonto Natural Bridge, 19 May 1935, *Nelson 2026* (NY).

Erigeron anchana apparently is endemic to northern Gila County, where it is abundant and centered in the Sierra Ancha. Its long branches are sprawling or arching to somewhat pendant as they usually emerge from nearly vertical habitats. The entire, spatulate, long petiolate leaves, the orange resinous veins of the phyllaries and disc corollas, and the numerous pappus bristles of this taxon are distinctive. The plants of *Benham 831* and *Nelson 2026* are clearly referable to *E. anchana* on the basis of their long stems, long petiolate leaves, and numerous (21-22) pappus bristles. Some of the leaves, however, have a pair of deep lobes or teeth, and outer squamellae are present in the pappus, both features more similar to those characteristic of *E. pringlei*. *Erigeron anchana*

and *E. pringlei* are similar in their long petiolate, spatulate (in outline) leaves, but the exact pattern of relationship between them or any of the species of the *E. pringlei* group is not clear.

Erigeron saxatilis Nesom, *sp. nov.* TYPE: UNITED STATES. Arizona: Coconino Co., Oak Creek Canyon, [SW] of Flagstaff, caespitose in fissures of sandstone cliffs, rare, 5500 ft, 24 May 1940, *H.D. Ripley & R.C. Barneby 3109* (HOLOTYPE: NY!; Isotype: NY!).

Erigeron heliographi Nesom similis sed foliis anguste oblanceolatis, corollis disci brevioribus, et setis pappi paucioribus differt.

Perennials from a thick taproot bearing several crowded, thick caudex branches 1-3 cm long and roughened with old petiole bases, with sparsely short strigose to nearly glabrous stems and leaves. Stems 3-5 cm long, erect to ascending, unbranched. Basal leaves tufted, erect, narrowly linear-ob lanceolate, 1-3 cm long, 0.5-2.0(-3.0) mm wide, entire; cauline like the basal, slightly reduced upwards or reduced to linear bracts below the heads. Heads 6-7 mm wide (pressed), on bracteate peduncles 8-15 mm long; phyllaries elliptic-ob lanceolate, glabrous or very sparsely strigose, usually purplish, with slightly lacerate ciliate margins, strongly graduated in 3-4 series, the innermost 2.5-3.5 mm long. Ray flowers 20-29 in a single series, the corollas 5.5-7.0 mm long, white, drying white to very slightly lavender, the ligules 1.0-1.5 mm wide, reflexing with maturity. Disc corollas 2.1-3.0 mm long, narrowly funnelform, not strongly inflated or indurated. Achenes sparsely strigose, 1.3-1.6 mm long; pappus of 9-13(-15) persistent bristles, the longest 2.5-2.6 mm long, with a few, inconspicuous outer setae 0.1-0.2 mm long. Flowering April-July(-September), 4400-8350 ft.

Additional collections examined: UNITED STATES. Arizona. Coconino Co.: West Fork Oak Creek Canyon, ca. 3 mi upstream from the jct of West Fork and Oak Creek, 11 mi N of Sedona. 4400 ft, 28 May 1986, *Benham 838* (ASC); E side of East Clear Creek at the jct of USFS Roads 95 and 96, ca. 23 air mi NE of Payson, 6540 ft, 12 Sep 1987, *Benham 1058* (ASC); Red Hill, 15 mi NE of Blue Ridge, 5800 ft, 10 Jun 1987, *Boucher 636* (ASC); entrance to Walnut Canyon, ca. 7000 ft, 5 Jun 1987, *Boucher 646* (ASC); Mogollon Rim, Barbershop Canyon, 6800 ft, 25 Jun 1987, *Boucher 654* (ASC); Walnut Canyon, 6400 ft, 8 Jun 1982, *Goodwin 1315* (ASC); 0.5 mi S 50° W of Little Elden Spring on the NE ridge, 8350 ft, 29 Jul 1985 [almost completely past flr], *Morefield 2964* (ASC, NY).

The geographic range of *Erigeron saxatilis* apparently is contiguous with that of *E. anchana*, but the former is restricted to the plateau demarcated by the Mogollon Rim. All collections of *E. anchana* have been made south of the rim, and except for one collection, the two taxa appear to be completely distinct in morphology. The plants of *Benham 1058*, from near the Mogollon

Rim, have long stems (to 15 cm) and relatively large basal leaves (1-5 mm wide, to 5 cm long) and in these respects approach *E. anchana* in habit, but in all other features they are inseparable from *E. saxatilis*. In addition to the differences noted in the key couplet above, *E. saxatilis* tends to flower earlier than *E. anchana*.

Erigeron saxatilis differs from *E. heliographis* in its apically broadened leaf blades, shorter disc corollas, and fewer and shorter pappus bristles.

RELATIONSHIPS

Erigeron pringlei was placed in sect. *Scopulincola* (Nesom 1989) along with three other species, *E. leiomerus* A. Gray, *E. kachinensis* Welsh & Moore, and *E. scopulinus* Nesom & Roth. The new species described here also belong in this section. Phylogenetic relationships within sect. *Scopulincola* are obscure, but the entire, spatulate to oblanceolate leaves of *E. anchana* and *E. saxatilis* are the most similar to species of the section outside of the *E. pringlei* group, and on that basis they might be hypothesized to be the most primitive in the group. *Erigeron heliographis* and *E. saxatilis* are the only species of the section with such narrow leaves, and *E. pringlei* is the only species with lobed leaves.

Within sect. *Scopulincola*, *Erigeron scopulinus* may be more closely related to the *E. pringlei* group than *E. leiomerus* or *E. kachinensis*, a hypothesis based on its more similar geographic distribution in the Chiricahua Mountains of southeastern Arizona and in adjacent New Mexico (Nesom & Roth 1981). It differs from the *E. pringlei* group in its solitary heads on essentially scapose stems and its matted rhizomatous habit, the latter feature shared with *E. leiomerus* and *E. kachinensis*.

ACKNOWLEDGMENTS

I thank Dr. B.L. Turner, Dr. T.P. Ramamoorthy, and Dr. D.J. Pinkava for their review and comments on the manuscript and ARIZ, ASC, ASU, and NY for loans of specimens. Other specimens cited were studied in the herbaria where housed.

LITERATURE CITED

- Cronquist, A. 1947. Revision of the North American species of *Erigeron*, north of Mexico. *Brittonia* 6:121-302.
- Nesom, G.L. 1989. Infrageneric taxonomy of New World *Erigeron* (Compositae: Astereae). *Phytologia* 67:67-93.
- Nesom, G.L. & V.D. Roth. 1981. *Erigeron scopulinus* (Compositae), an endemic from the southwestern United States. *J. Ariz.-Nevada Acad. Sci.* 16:39-42.
- Schaack, C.G. 1983. *In* IOPB chromosome number reports LXXX. *Taxon* 32:509.